

٢. اقرئ

$$1) \quad \frac{x-1}{x} - \frac{x}{x-1} \geq 0 \rightarrow \frac{x^2-2x+1}{x(x-1)} \geq 0 \rightarrow \frac{(x-1)^2}{x(x-1)} \geq 0$$

$$D_f = (-\infty, 0) \cup [1, +\infty)$$

$$2) \quad x \leq -1 \text{ و } 0 < x < 1 \text{ و } x \geq 2$$

$$\frac{x}{x-1} + \frac{1}{x+2} \geq 0 \rightarrow \frac{x(x+2) + (x-1)}{(x-1)(x+2)} \geq 0 \rightarrow \frac{x^2+3x-1}{(x-1)(x+2)} \geq 0 \rightarrow x \geq -\frac{3}{2}$$

$$D_f = \mathbb{R} - \left\{ -\frac{3}{2}, -1, 0, 1, 2 \right\}$$

$$1) \quad \left(\frac{1}{x} - 1 \right) (x^2 - x^4) \geq 0$$

$$D_f = \mathbb{R} - (-2, 2)$$

$$2) \quad \sqrt{x-1} = 3 - \sqrt{x-1} \rightarrow \sqrt{x-1} \geq 1$$

$$x - \sqrt{x-1} \geq 0 \rightarrow x \geq \sqrt{x-1}$$

$$D_f = [1, 2]$$

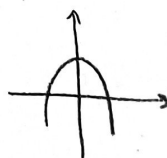
$$f(x) = \frac{\log x}{\sqrt{x^2-1} + 1}$$

$$x^2-1 \geq 0 \rightarrow x \geq 1 \text{ و } x \leq -1$$

$$x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0 \rightarrow (-\infty, -1) \cup (2, +\infty)$$

$$1) \cap (2) \rightarrow D_f = (-\infty, -1) \cup (2, +\infty)$$

$$f(x) = 0 \rightarrow x^2 - 2x - 1 = 0 \rightarrow x = -\frac{1}{2}$$



$$f(x) = \sqrt{-x^2 - \frac{1}{4}x + 3}$$

$$-x^2 - \frac{1}{4}x + 3 = 0$$

$$x^2 + \frac{1}{4}x - 3 = 0 \rightarrow \frac{-\frac{1}{4} \pm \sqrt{\frac{1}{16} - 4(-3)}}{2} = \frac{-\frac{1}{4} \pm \sqrt{\frac{1}{16} + 12}}{2} = \frac{-\frac{1}{4} \pm \sqrt{\frac{193}{16}}}{2}$$

$$a+b \rightarrow -\frac{1}{4} + \frac{\sqrt{193}}{4}$$

$$\frac{-\frac{1}{4} - \frac{\sqrt{193}}{4}}{2} = -\frac{1}{4}$$

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$$f(n) = n \geq 0 \rightarrow f(n) \geq n$$

$$n \geq 1 \rightarrow n-1 \geq n \rightarrow n \geq 1 \quad (I)$$

$$n < 1 \rightarrow 2n + 1 \geq n \rightarrow n \geq -1 \rightarrow -1 \leq n < 1 \quad (II)$$

$$(I) \cup (II) \rightarrow D_f = [-1, +\infty)$$

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$$f(x) = 2x(x-1)$$

$$f\left(\frac{\sqrt{x}+1}{2}\right) \rightarrow f\left(\frac{1+\sqrt{x}}{2}\right) = 2 \cdot \frac{1+\sqrt{x}}{2} \left(\frac{1+\sqrt{x}}{2} - 1\right) \rightarrow \frac{x-1}{4} \rightarrow \frac{-1}{4}$$

$$f\left(\frac{a+1}{a-1}\right) = a \rightarrow \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = a \rightarrow \frac{a+1+a-1}{a-1} = a$$

$$f(a) = \frac{a+1}{a-1}$$

$$\frac{2a}{1} = a \rightarrow 2a = a$$

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$$D_f = \mathbb{R} - \{1\}$$

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$$f(g(a)) = -\varepsilon$$

$$a^2 - f(a) = -\varepsilon$$

$$a^2 - f(a) + \varepsilon = 0 \rightarrow (a-r)^2 = 0$$

$$a = r \rightarrow g(a) = r$$

$$\sqrt{a^2-1} = r \rightarrow a^2-1 = r^2$$

$$a^2 = r^2 + 1$$

$$a = \pm \sqrt{r^2+1}$$

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$$f(x) = 1 - x + y \rightarrow f(x) = y$$

if $x=1$

$$f(x) + f(-x) = 1 + 1 = 2$$

$$f(x) = -y \rightarrow f(-x) = 1 + y + y \rightarrow f(-x) = 1 + 2y$$

$$r(\cos^2 \theta + \sin^2 \theta) = r, 0 \rightarrow r(\cos^2 \theta + \sin^2 \theta - 1) = 0$$

$$-0 \pm \sqrt{1-(-1)} \rightarrow -0 \pm 1 \rightarrow \frac{1}{2} \leq \frac{\sqrt{3}}{2}$$

$$\cos \theta = \frac{1}{2} \rightarrow \theta = 60^\circ$$

$$\tan \theta = \pm \sqrt{3} \rightarrow \tan \theta = \sqrt{3}$$

$$f(r, \theta) = \sqrt{3}$$